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# Xerographic Development of an Image Stored in a PLZT FE/PC Device

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The recent development of transparent ferroelectric ceramics in La-modified lead zirconate titanate (PLZT) solid solution system[1] has made possible an erasable image storage device.[2,3] The device has a four layer FE/PC structure consisting of a polyvinyl carbazole photoconductive film, $In_2O_3$-$SnO_2$(91:9 mol %) transparently sputtered electrodes and a PLZT ceramic plate.

The ceramic plate of $Pb_{0.924}La_{0.076}(Zr_{0.7}Ti_{0.3})_{0.981}O_3$ (abbreviated to 7.6/70/30 PLZT) shows a longitudinal electrooptic light scattering effect[4] accompanied by a field-induced phase transition. Since field-induced phase transition in an antiferroelectric(AFE)-ferroelectric(FE) coexisting PLZT ceramic plate is a reversible change, this field-induced light-scattering effect is applicable to an erasable image storage and display device.[5]

This paper shows the xerographic development of a visible image stored on the PLZT ceramic plate. The method utilizes the pyroelectric effect of the FE state of image stored portions which are built in an AFE ceramic plate. The experimental samples were prepared as a three layer FE/PC structure with only one electrode. The sample, in which the electrode-less surface was attached to a conductive glass plate with glycerin water, could be used for fixing an image reconstructed brightly on it by the application of an electric field.

This image was developed according to the following method. The sample was removed from the conductive glass and then immersed in toner liquid. Next, a 200-watt lamp was illuminated to heat the sample for a few seconds, thereby developing the latent image as a white/black image fixed with toner powder as shown in Fig. 1.

The latent image remained stable even after the process transferring the white/black image onto the separate sheet. This effect suggests potential utility for multiple printing from an image. The latent image could be cleanly erased by immersing the sample in hot water upon completing the printing process.

Here, the development process becomes simpler, if 7.9/70/30-PLZT ceramic, which has been developed as a display material, is used for the image storage plate. This material is AFE in its natural state and shows a separate double hysteresis loop under an AC electric field. Consequently,it does not have a memory function. However, the stored image remained stable after removing the plate from a conductive glass plate which, in effect, kept in an open circuited condition.

In order to develop the image with toner fixing, the plate was immersed in a metal vessel of toner liquid with the electrode surface facing upwards. A black/white image appeared suddenly when the electrode of the plate came in electrical contact with the vessel. This means that the display material has the advantage of simplified xerographic development, over the AFE-FE coexisting material. The resolution measured for the latent image was about 20 line pairs per mm or 17 characters per cm.

In conclusion, the present xerographic development of an image stored on a PLZT FE/PC device is capable of multiple printing from only one visible image stored in it. Given necessary refinements, this technology promises to considerably enhance existing copying hardware.

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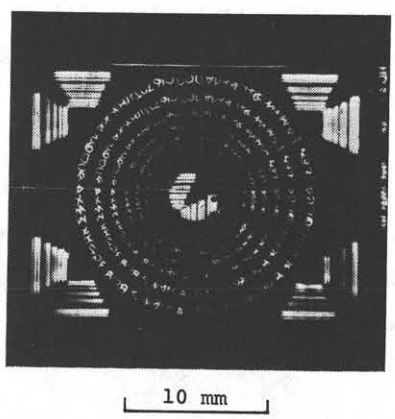


Figure 1. Photograph of a xerographic toner powder pattern which was developed from an image stored in a PLZT FE/PC device.